18

Claims

1. A method for synchronizing a radio communication system
   divided up into radio cells, wherein data is transmitted by
   means of timeslot multiple access methods and wherein each
   radio cell has a base station for providing radio coverage
   to a plurality of mobile stations assigned to the radio
   cell,

   characterized in that
   - in addition to mobile station signals of its own radio
     cell, a base station also receives mobile station signals
     from adjacent radio cells,
   - the base station determines a number of mobile stations on
     the basis of the mobile station signals and compares said
     number with at least one predefined threshold value,
   - if the number falls below at least one threshold value a
     first synchronization method for synchronizing the base
     station and the assigned mobile stations is used, said
     first synchronization method corresponding to an assigned
     transmission standard of the radio communication system,
     and
   - if the number exceeds at least one threshold value a
     second synchronization method for synchronizing the base
     station and the assigned mobile stations is used, said
     second synchronization method dispensing with a regular
     transmission of information between base station and
     mobile station.

2. The method as claimed in claim 2, characterized in that
   - with the second synchronization method a base station
     evaluates the received mobile station signals to determine
     a time synchronization value and a frequency

19

synchronization value to which the base station
synchronizes itself,

- with the second synchronization method, as well as base
  station signals of its own radio cell, a mobile station
  also receives base station signals from adjacent radio
  cells,

- with the second synchronization method the mobile station
  evaluates the received base station signals to determine a
  time synchronization value and a frequency synchronization
  value to which the mobile station synchronizes itself, and

- base stations of adjacent radio cells use radio
  transmission resources from a stock that is collectively
  assigned to the base stations for data transmission
  purposes.

3. The method as claimed in claim 1 or 2, characterized in
   that with the second synchronization method the base
   stations use timeslots of collectively assigned carrier
   frequencies as radio transmissions resources.

4. The method as claimed in one of the preceding claims,
   characterized in that with the second synchronization method
   at least two adjacent base stations (BTS1, BTS3)
   simultaneously and jointly employ a timeslot (TS5) of a
   carrier frequency (f5) for providing radio coverage to a
   respectively assigned mobile station (T14, T32) and the
   timeslot (TS5) is selected from the collectively assigned
   radio transmission resources taking account of an
   interference situation in the timeslot (TS5).

5. The method as claimed in one of the preceding claims,
   characterized in that with the second synchronization method
   both the base station and the mobile station adjust carrier

frequencies and timeslot transmitting instants employed on a subscriber-specific basis.

6. The method as claimed in one of the preceding claims, characterized in that co-channel interference is minimized at the base station and/or mobile station by means of interference suppression methods.

7. The method as claimed in one of the preceding claims, characterized in that radio transmission resources are assigned on the base station side in such a way that co-channel interference on adjacent radio cells is minimized.

8. The method as claimed in one of the preceding claims, characterized in that an OFDM radio transmission method is employed in the radio communication system.

9. The method as claimed in one of the preceding claims, characterized in that a TDD or FDD radio transmission method is employed in the radio communication system.

10. The method as claimed in one of the preceding claims, characterized in that with the second synchronization method a time deviation is determined by correlation and a frequency deviation is determined by ascertaining a phase rotation of consecutive symbols following a transformation into the frequency range.

11. The method as claimed in one of the preceding claims, characterized in that the second synchronization method is performed without additional signaling using a higher protocol layer between the base station and assigned mobile station.

12. The method as claimed in one of the preceding claims, characterized in that the synchronization method is selected by means of a time-dependent hysteresis function specified by a threshold value range.